

# Air Toxics Risk Assessment Modeling Tools Symposium

## MOBILE6.2 Hands On Demonstration



# MOBILE6 Input File Basics

- MOBILE6 is not interactive; an input file must be prepared
- Input files MUST:
  - Be in DOS text (ASCII) format
  - NOT contain TAB characters
  - NOT have a root name longer than 8 characters
- Use a text editor (e.g., Notepad)
- Use a word processor and use the "Save As" command to save as a DOS text file
- Use a non-proportional font (e.g., Courier)

# "Bare Bones" MOBILE6 Input File

```
123456789012345678901234567890123456789012...
MOBILE6 INPUT FILE
RUN DATA
SCENARIO RECORD      : The Title Goes Here
CALENDAR YEAR        : 2000
MIN/MAX TEMP          : 72.0  92.0
FUEL RVP              : 8.7
END OF RUN
```

- Columns 1 to 19 contain "Command Names"
- By convention, column 20 contains a colon when data are input but is not required; column 21 is left blank
- Columns 22-150 contain specific inputs that are either free-format or fixed-format
  - In free-format, the data values are entered into any column, but must be separated by a blank space
  - In fixed-format, the inputs follow Fortran formatting rules
- The seven lines reflected in the input file above are the only required inputs for a MOBILE6 run

# MOBILE6 Input File Structure

- MOBILE6 input files are broken up into three sections:
  - HEADER
  - RUN
  - SCENARIO
- Certain commands can only be placed in one of these three sections
- An END OF RUN command appears at the end to mark the end of the run and to separate multiple runs

```
***** Header Section *****
MOBILE6 INPUT FILE :

RUN DATA      :
***** Run Section *****

***** Scenario Section *****
SCENARIO RECORD   : The Title Goes Here
CALENDAR YEAR     : 2000
MIN/MAX TEMP      : 72.0  92.0
FUEL RVP          : 8.7

***** End of This Run *****
END OF RUN      :
```

# Summary of MOBILE6 Commands

Required Commands	
Parameter	Comments
Min/Max or Hourly Temperatures RVP Calendar Year	Used to estimate TCF temp. evap temps, diurnal emissions. Gasoline volatility. Range: 1955 to 2050.
Optional Commands	
Parameter	Comments
<u>Output Options:</u> Reporting HC Results Specify Pollutant(s) to Print Expanded Exhaust/Evap Results Expanded LDT/HDT/Bus Results Database Output	HC can be reported as THC, NMHC, VOC, TOG, NMOG HC, CO, and/or NOx can be printed. Allows more detail to be output. Allows more detail to be output. Allows for MY-specific and other detailed output.
<u>Activity Parameters:</u> VMT Mix by Veh Type Alternate VMT Distribution by Hour Alternate VMT Distribution by Facility Type VMT by Speed Distribution Average Speed Starts per Day Start Distribution Soak Time Distribution Hot Soak Activity Diurnal Soak Activity	User may input locally derived VMT mix. Takes the place of average speed. Takes the place of average speed. Takes the place of average speed. User can input average speed. Alternate number of starts by hour of day. Alternate distribution of starts Alternate distribution of soak time by hour of day Alternate distribution of hot soak length Alternate distribution of diurnal soak times
<u>Fleet Characteristics:</u> Registration Distribution Mileage Accumulation Alternate Diesel Sales Fraction NGV Fractions	User may input locally derived registration distribution. User may input locally derived mileage accumulation rates. User may input locally derived LDV Diesel registration info. User may specify a fraction of natural gas vehicles.

# Summary of MOBILE6 Commands - Continued

Optional Commands	
Parameter	Comments
<u>External Conditions:</u> Month of Evaluation Altitude Humidity Cloud Cover Peak Sun Sunrise/Sunset	Jan or Jul - choice based on winter or summer evaluation. Low/high altitude - low is default. Used for A/C calculations and impacts exhaust NOx. Used primarily for A/C calculations. Used primarily for A/C calculations. Used primarily for A/C calculations.
<u>Fuels Options:</u> Reformulated Gasoline Gasoline Sulfur Level Oxygenated Fuels	Effects of reformulated gasoline can be included. Local data on gasoline sulfur level can be entered. Ether/alcohol market share and oxygen content required.
<u>State Programs:</u> I/M Program Anti-Tampering Program Functional Pressure/Cap Check Refueling Emissions	Idle, Idle/2500, ASM, and 1M240 tests included in MOBILE5. Effects of an anti-tampering program can be included. Effects of a functional evap system check can be included. Uncontrolled, with Stage II, with on-board, or zeroed.
<u>Miscellaneous Options:</u> Disable CAAA Requirements Tier 1/Tier 2/LEV Implementation HDDV Defeat Device Parameters 2007 HDDV Rule Disablement	Cold CO, Tier 1 and 2, and evap benefits can be disabled. Implementation and emission rates can be modified. Inputs to the defeat device emissions calcs can be modified. Disables the impacts of this regulation.

# **MOBILE6.2**

## **Motor Vehicle Air Toxics Emission Factors**

- In MOBILE6.2, emissions estimates are generated for:
  - - Benzene
  - - MTBE
  - - 1,3-Butadiene
  - - Acetaldehyde
  - - Formaldehyde
  - - Acrolein
- Accept user-defined toxic emission factors or mass fractions

# MOBILE6.2 – Input Parameter Data

- Additional commands and parameters are needed for a MOBILE6.2 run:
  - AIR TOXICS : Enables calculations
  - GAS AROMATIC% : Aromatic content (vol%)
  - GAS OLEFIN% : Olefin content (vol%)
  - GAS BENZENE% : Benzene content (vol%)
  - E200 : E200 percentage
  - E300 : E300 percentage
  - OXYGENATE : Oxygenate type and content (vol%)
  - Optional Command
    - ADDITIONAL HAPS: User-input EFs for additional HAPs

# MOBILE6.2 – Input Parameter Data

## Summary of air toxics abbreviations

HAP	Abbreviation
Benzene	BENZ
Methyl Tertiary Butyl Ether	MTBE
1,3-Butadiene	BUTA
Formaldehyde	FORM
Acetaldehyde	ACET
Acrolein	ACRO

# MOBILE6.2 Commands for Toxic Emission Factors

MOBILE6.2 Command	Header/ Run/ Scenario?	Required Command?	Comment
AIR TOXICS : BENZ BUTA ACRO	H	YES*	Enables HAP calculations and specifies which pollutants are calculated and reported. If HAPs are not specified, all are reported.
ADDITIONAL HAPS : HAP.CSV	S	NO	Allows user to enter alternative emission factors or air toxic ratios for additional HAPs.
GAS AROMATIC% : 20.0	S	YES*	Gasoline aromatic content Range: 10 to 55% by volume
GAS OLEFIN% : 10.0	S	YES*	Gasoline olefin content Range: 0 to 30% by volume
GAS BENZENE% : 1.0	S	YES*	Gasoline benzene content Range: 0 to 5% by volume
E200 : 50.0	S	YES*	% gasoline evaporated at 200 F Range: 30 to 70%
E300 : 90.0	S	YES*	% gasoline evaporated at 300 F Range: 70 to 100%
OXYGENATE : MTBE 15.1 0.50 ETBE 0.0 0.00 ETOH 10.0 0.50 TAME 0.0 0.00	S	YES*	Specifies oxygenate type, content (in vol%), and market share. Supercedes the OXYGENATED FUELS command.
RVP OXY WAIVER : 2	S	NO	Specifies whether an RVP waiver has been granted for splash-blended ETOH (1=No; 2=Yes). Default = No waiver.

\* Required when toxics calculations are desired.

# **Additional Detail - OXYGENATE Command**

- Four oxygenate types must be entered
  - MTBE is Methyl Tertiary Butyl Ether
  - ETBE is Ethyl Tertiary Butyl Ether
  - ETOH is Ethanol or Ethyl Alcohol
  - TAME is Tertiary Amine Methyl Ether
- The OXYGENATE command requires:
  - oxygenate type
  - content (in volume %)
  - market share
- Fuel oxygen content is 0 to 3.7 wt% oxygen, which translates to the following vol%:

• MTBE	20.7%	Ethanol	10.7%
• ETBE	24.1%	TAME	22.6%

# **MOBILE6.2 – Input Parameter Data Notes**

- Fuel Parameters Important
- Survey Data Available
  - Some Data On OTAQ's Website
- AIR TOXICS command cannot be used in conjunction with the RFG FUEL PROGRAM
  - User Needs to Input RFG Parameters
    - Gasoline sulfur content
    - Gasoline RVP
    - Gasoline oxygenate content

# **MOBILE Output Options**

- Database Output

- very detailed output
- unless variables are limited, each run will be approximately 40 megabytes per scenario

- Descriptive Output

- default output
- text file - .tox extension

- Spreadsheet Output

- SPREADSHEET command
- tab-delimited file

- Error Messages included in m6error.txt file

# Example 1

Generate Acrolein, Benzene, and 1,3 Butadiene emission rates for 2003.

Temperature: 73°F to 92°F

RVP (psi):	9.0
Benzene (vol%):	1.5
Aromatics (vol%):	25
Olefins (vol%):	15
E200 (%):	50
E300 (%):	85

Oxygenate	Sales Mix(%)	Oxy Content (vol%)
MTBE	50	15.1
ETBE	5	17.6
ETOH	45	10.0
TAME	0	6.0

# Example1 - Input File

MOBILE6 INPUT FILE : toxsym1.in  
AIR TOXICS : BENZ FORM acro  
POLLUTANTS : hc  
REPORT FILE : toxsym1.out  
\*\*\*\*\*

## RUN DATA

>Modeling Symposium Toxics Example #1

MIN/MAX TEMP : 73. 92.

FUEL RVP : 9.0

EXPAND EVAPORATIVE :

\*\*\*\*\*

SCENARIO REC : TOXSYM EX1 2003

CALENDAR YEAR : 2003

EVALUATION MONTH : 7

GAS AROMATIC% : 25

GAS OLEFIN% : 15

GAS BENZENE% : 1.5

E200 : 50

E300 : 85

OXYGENATE : MTBE 15.1 0.50

: ETBE 17.6 0.05

: ETOH 10.0 0.45

: TAME 6.0 0.00

\*\*\*\*\*

# Example1 Results

\* #  
 \* TOXSYM EX1 2003  
 \* File 1, Run 1, Scenario 1.  
 \* #

Calendar Year: 2003  
 Month: July  
 Market Weighted Oxygen Level: 3.053 wt%  
 Gasoline Fuel Sulfur Content: 259. ppm  
 Maximum Temperature: 92.0 F  
 Minimum Temperature: 73.0 F  
 Weathered RVP: 8.6 psi  
 E200: 50.00 %  
 E300: 85.00 %  
 Aromatics: 25.00 vol%  
 Olefins: 15.00 vol%  
 Benzene: 1.50 vol%  
 MTBE: 15.10 vol% (market fraction: 0.500)  
 ETBE: 17.60 vol% (market fraction: 0.050)  
 Ethanol: 10.00 vol% (market fraction: 0.450)  
 TAME: 6.00 vol% (market fraction: 0.000)

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.4424	0.3195	0.1099		0.0361	0.0007	0.0017	0.0839	0.0059	1.0000

Exhaust Emission Factors (mg/mi):										
Benzene:	37.94	47.58	67.68	52.72	31.76	14.63	19.40	6.71	55.63	41.502
1,3 Butadiene:	5.05	5.98	8.14	6.53	4.49	6.58	8.73	3.90	18.34	5.657
Acrolein:	0.43	0.58	0.91	0.66	2.56	2.56	3.39	2.24	1.05	0.770

Evaporative Emission Factors (mg/mi):										
Benzene Hot Soak :	2.27	1.84	2.59	2.03	3.95	0.00	0.00	0.00	3.95	2.042
Benzene Diurnal :	0.35	0.32	0.50	0.37	0.58	0.00	0.00	0.00	1.33	0.340
Benzene Running :	4.42	3.21	4.40	3.51	5.13	0.00	0.00	0.00	0.00	3.649
Benzene Resting :	1.15	1.07	1.75	1.24	2.18	0.00	0.00	0.00	3.33	1.141
Benzene Refueling:	1.01	1.74	2.88	2.03	4.35	0.00	0.00	0.00	0.00	1.475
Benzene Total Evp:	9.20	8.17	12.12	9.18	16.20	0.00	0.00	0.00	8.61	8.648

Exhaust + Evaporative Emission Factors (mg/mi):										
Benzene Exh + Evp:	47.15	55.75	79.80	61.90	47.96	14.63	19.40	6.71	64.24	50.150

# Example 2

Generate Acrolein, Benzene, and 1,3 Butadiene emission rates for 2003 with increased tempertures.

Temperature: 80°F to 98°F

RVP (psi):	9.0
Benzene (vol%):	1.5
Aromatics (vol%):	25
Olefins (vol%):	15
E200 (%):	50
E300 (%):	85

Oxygenate	Sales Mix(%)	Oxy Content (vol%)
MTBE	50	15.1
ETBE	5	17.6
ETOH	45	10.0
TAME	0	6.0

# Example 2 - Input File

MOBILE6 INPUT FILE : toxsym2.in  
AIR TOXICS : BENZ BUTA acro  
POLLUTANTS : hc  
REPORT FILE : toxsym2.out

\*\*\*\*\*

RUN DATA

>Modeling Symposium Toxics Example #2

MIN/MAX TEMP : 80. 98.

FUEL RVP : 9.0

EXPAND EVAPORATIVE :

\*\*\*\*\*

SCENARIO REC : TOXSYM EX2 2003 - temp increase

CALENDAR YEAR : 2003

EVALUATION MONTH : 7

GAS AROMATIC% : 25

GAS OLEFIN% : 15

GAS BENZENE% : 1.5

E200 : 50

E300 : 85

OXYGENATE : MTBE 15.1 0.50

: ETBE 17.6 0.05

: ETOH 10.0 0.45

: TAME 6.0 0.00

\*\*\*\*\*

# Example2 Results

\* #  
 \* TOXSYM EX2 2003  
 \* File 1, Run 1, Scenario 1.  
 \* #

Calendar Year: 2003  
 Month: July  
 Market Weighted Oxygen Level: 3.053 wt%  
 Gasoline Fuel Sulfur Content: 259. ppm  
 Maximum Temperature: 98.0 F  
 Minimum Temperature: 80.0 F  
 Weathered RVP: 8.4 psi  
 E200: 50.00 %  
 E300: 85.00 %  
 Aromatics: 25.00 vol%  
 Olefins: 15.00 vol%  
 Benzene: 1.50 vol%  
 MTBE: 15.10 vol% (market fraction: 0.500)  
 ETBE: 17.60 vol% (market fraction: 0.050)  
 Ethanol: 10.00 vol% (market fraction: 0.450)  
 TAME: 6.00 vol% (market fraction: 0.000)

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.4424	0.3195	0.1099		0.0361	0.0007	0.0017	0.0839	0.0059	1.0000

## Exhaust Emission Factors (mg/mi):

Benzene:	38.94	49.04	70.25	54.47	32.88	14.63	19.40	6.71	56.72	42.741
1,3 Butadiene:	5.18	6.18	8.42	6.75	4.72	6.58	8.73	3.90	18.70	5.816
Acrolein:	0.44	0.60	0.95	0.69	2.70	2.56	3.39	2.24	1.07	0.789

## Evaporative Emission Factors (mg/mi):

Benzene Hot Soak :	2.59	2.13	3.06	2.37	4.87	0.00	0.00	0.00	5.24	2.368
Benzene Diurnal :	0.40	0.37	0.58	0.43	0.66	0.00	0.00	0.00	2.39	0.399
Benzene Running :	5.85	3.92	5.44	4.31	6.76	0.00	0.00	0.00	0.00	4.685
Benzene Resting :	1.27	1.16	1.87	1.34	2.36	0.00	0.00	0.00	3.55	1.245
Benzene Refueling:	1.12	1.93	3.20	2.26	4.83	0.00	0.00	0.00	0.00	1.638
Benzene Total Evp:	11.23	9.52	14.15	10.71	19.49	0.00	0.00	0.00	11.17	10.335

## Exhaust + Evaporative Emission Factors (mg/mi):

Benzene Exh + Evp:	50.18	58.57	84.40	65.18	52.36	14.63	19.40	6.71	67.89	53.076
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# **Example 3**

Generate Acrolein, Benzene, and 1,3 Butadiene emission rates for 2003 and 2008 with the same parameters as Example 1.

# Example 3 - Input File

```
MOBILE6 INPUT FILE : toxsym1.in
AIR TOXICS          : BENZ FORM acro
*****
RUN DATA
>Modeling Symposium Toxics Example #3
MIN/MAX TEMP        : 73. 92.
FUEL RVP            : 9.0
*****
SCENARIO REC       : TOXSYM EX3 2003
CALENDAR YEAR      : 2003
EVALUATION MONTH   : 7
GAS AROMATIC%      : 25
GAS OLEFIN%         : 15
GAS BENZENE%        : 1.5
E200                : 50
E300                : 85
OXYGENATE          : MTBE  15.1 0.50
                     : ETBE  17.6 0.05
                     : ETOH  10.0 0.45
                     : TAME   6.0 0.00
*****
SCENARIO REC       : TOXSYM EX3 2008
CALENDAR YEAR      : 2008
EVALUATION MONTH   : 7
GAS AROMATIC%      : 25
GAS OLEFIN%         : 15
GAS BENZENE%        : 1.5
E200                : 50
E300                : 85
OXYGENATE          : MTBE  15.1 0.50
                     : ETBE  17.6 0.05
                     : ETOH  10.0 0.45
                     : TAME   6.0 0.00
END OF RUN
```

# Example 3 - Results

\* #  
 \* TOXSYM EX3 2003  
 \* File 1, Run 1, Scenario 1.  
 \* #

Calendar Year: 2003  
 Month: July  
 Market Weighted Oxygen Level: 3.053 wt%  
 Gasoline Fuel Sulfur Content: 259. ppm  
 Maximum Temperature: 92.0 F  
 Minimum Temperature: 73.0 F  
 Weathered RVP: 8.6 psi  
 E200: 50.00 %  
 E300: 85.00 %  
 Aromatics: 25.00 vol%  
 Olefins: 15.00 vol%  
 Benzene: 1.50 vol%  
 MTBE: 15.10 vol% (market fraction: 0.500)  
 ETBE: 17.60 vol% (market fraction: 0.050)  
 Ethanol: 10.00 vol% (market fraction: 0.450)  
 TAME: 6.00 vol% (market fraction: 0.000)

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.4424	0.3195	0.1099		0.0361	0.0007	0.0017	0.0839	0.0059	1.0000

#### Exhaust Emission Factors (mg/mi):

Benzene:	37.94	47.58	67.68	52.72	31.76	14.63	19.40	6.71	55.63	41.502
1,3 Butadiene:	5.05	5.98	8.14	6.53	4.49	6.58	8.73	3.90	18.34	5.657
Acrolein:	0.43	0.58	0.91	0.66	2.56	2.56	3.39	2.24	1.05	0.770

#### Evaporative Emission Factors (mg/mi):

Benzene Hot Soak :	2.27	1.84	2.59	2.03	3.95	0.00	0.00	0.00	3.95	2.042
Benzene Diurnal :	0.35	0.32	0.50	0.37	0.58	0.00	0.00	0.00	1.33	0.340
Benzene Running :	4.42	3.21	4.40	3.51	5.13	0.00	0.00	0.00	0.00	3.649
Benzene Resting :	1.15	1.07	1.75	1.24	2.18	0.00	0.00	0.00	3.33	1.141
Benzene Refueling:	1.01	1.74	2.88	2.03	4.35	0.00	0.00	0.00	0.00	1.475
Benzene Total Evp:	9.20	8.17	12.12	9.18	16.20	0.00	0.00	0.00	8.61	8.648

#### Exhaust + Evaporative Emission Factors (mg/mi):

Benzene Exh + Evp:	47.15	55.75	79.80	61.90	47.96	14.63	19.40	6.71	64.24	50.150
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# **Example 3 - Results continued**

```
# # # # # # # # # # # # # # # # # # # # # # # #  
* TOXSYM EX3 2008  
* File 1, Run 1, Scenario 2.  
* # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2008  
Month: July  
d Oxygen Level: 3.053 wt%  
Sulfur Content: 30. ppm  
um Temperature: 92.0 F  
um Temperature: 73.0 F  
Weathered RVP: 8.6 psi  
E200: 50.00 %  
E300: 85.00 %  
Aromatics: 25.00 vol%  
Olefins: 15.00 vol%  
Benzene: 1.50 vol%  
MTBE: 15.10 vol% (market fraction: 0.500)  
ETBE: 17.60 vol% (market fraction: 0.050)  
Ethanol: 10.00 vol% (market fraction: 0.450)  
TAME: 6.00 vol% (market fraction: 0.000)

Vehicle Type: LDGV LDGT12 LDGT34 LDGT HDGV LDDV LDDT HDDV MC All Veh  
 GVWR: <6000 >6000 (All)

VMT Distribution: 0.3728 0.3705 0.1273 0.0359 0.0004 0.0019 0.0857 0.0055 1.0000

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ust Emission Factors (mg/mi):

Benzene:	20.55	24.25	37.14	27.55	17.22	5.78	11.04	4.91	55.63	22.744
1,3 Butadiene:	2.69	3.07	4.88	3.54	1.84	2.60	4.97	2.85	18.34	3.188
Acrolein:	0.22	0.27	0.43	0.31	0.94	1.01	1.93	1.64	1.05	0.422

Evaporative Emission Factors (mg/mi):

Benzene Hot Soak :	1.91	1.59	2.63	1.86	2.60	0.00	0.00	0.00	4.03	1.753
Benzene Diurnal :	0.24	0.24	0.39	0.28	0.44	0.00	0.00	0.00	1.31	0.252
Benzene Running :	2.85	2.04	3.41	2.39	3.47	0.00	0.00	0.00	0.00	2.378
Benzene Resting :	0.83	0.82	1.48	0.99	1.49	0.00	0.00	0.00	3.15	0.873
Benzene Refueling:	0.48	0.85	1.72	1.07	2.97	0.00	0.00	0.00	0.00	0.819
Benzene Total Evp:	6.31	5.55	9.63	6.59	10.96	0.00	0.00	0.00	8.49	6.074

Exhaust + Evaporative Emission Factors (mg/mi):  
Benzene Exh + Evp: 26.86 29.80 46.77 34.14 28.19 5.78 11.04 4.91 64.12 28.818

# Example 4

Generate Acrolein, Benzene, and 1,3 Butadiene emission rates for 2003 and a local fuel program.

Temperature: 73°F to 92°F

RVP (psi):	6.8
Benzene (vol%):	0.85
Aromatics (vol%):	19
Olefins (vol%):	7.7
E200 (%):	45
E300 (%):	84

Oxygenate	Sales Mix(%)	Oxy Content (vol%)
MTBE	0	15.1
ETBE	0	17.6
ETOH	100	10.0
TAME	0	6.0

# Example 4 - Input File

```
MOBILE6 INPUT FILE : toxsym4.in
AIR TOXICS          : BENZ BUTA acro
POLLUTANTS         : hc
REPORT FILE        : toxsym4.out
```

RUN DATA

>Modeling Symposium Toxics Example #4

```
MIN/MAX TEMP       : 73. 92.
FUEL RVP           : 6.8
```

EXPAND EVAPORATIVE :

```
*****
SCENARIO REC      : TOXSYM EX3 2003
CALENDAR YEAR     : 2003
EVALUATION MONTH  : 7
GAS AROMATIC%    : 19
GAS OLEFIN%       : 7.7
GAS BENZENE%      : 0.85
E200              : 45
E300              : 84
OXYGENATE         : MTBE 0.0 0.0
                  : ETBE 0.0 0.0
                  : ETOH 10.0 1.0
                  : TAME 0.0 0.0
FUEL PROGRAM      : 4
88.0 116.0 122.0 122.0 122.0 33.0 33.0
30.0 30.0 30.0 30.0 30.0 30.0 30.0
1000.0 1000.0 1000.0 1000.0 303.0 303.0 87.0 87.0
80.0 80.0 80.0 80.0 80.0 80.0 80.0 80.0
*****
```

END OF RUN

# Example 4 - Results

\* #  
 \* TOXSYM EX4 2003 - fuel program  
 \* File 1, Run 1, Scenario 1.  
 \* #

Calendar Year: 2003  
 Month: July  
 Market Weighted Oxygen Level: 3.488 wt%  
 Gasoline Fuel Sulfur Content: 122. ppm  
 Maximum Temperature: 92.0 F  
 Minimum Temperature: 73.0 F  
 Weathered RVP: 6.5 psi  
 E200: 45.00 %  
 E300: 84.00 %  
 Aromatics: 19.00 vol%  
 Olefins: 7.70 vol%  
 Benzene: 0.85 vol%  
 MTBE: 0.00 vol% (market fraction: 0.000)  
 ETBE: 0.00 vol% (market fraction: 0.000)  
 Ethanol: 10.00 vol% (market fraction: 1.000)  
 TAME: 0.00 vol% (market fraction: 0.000)

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.4424	0.3195	0.1099		0.0361	0.0007	0.0017	0.0839	0.0059	1.0000

#### Exhaust Emission Factors (mg/mi):

Benzene:	26.47	31.82	44.67	35.10	20.43	14.63	19.40	6.71	33.05	28.321
1,3 Butadiene:	3.96	4.86	6.74	5.34	5.09	6.58	8.73	3.90	18.15	4.685
Acrolein:	0.38	0.52	0.85	0.60	2.49	2.56	3.39	2.24	1.05	0.721

#### Evaporative Emission Factors (mg/mi):

Benzene Hot Soak :	1.12	0.86	1.18	0.94	1.67	0.00	0.00	0.00	0.76	0.965
Benzene Diurnal :	0.14	0.14	0.23	0.16	0.27	0.00	0.00	0.00	0.03	0.143
Benzene Running :	1.63	1.29	1.71	1.40	1.76	0.00	0.00	0.00	0.00	1.384
Benzene Resting :	0.82	0.76	1.25	0.89	1.56	0.00	0.00	0.00	2.38	0.814
Benzene Refueling:	0.55	0.94	1.56	1.10	2.36	0.00	0.00	0.00	0.00	0.802
Benzene Total Evp:	4.26	4.00	5.92	4.49	7.62	0.00	0.00	0.00	3.18	4.109

#### Exhaust + Evaporative Emission Factors (mg/mi):

Benzene Exh + Evp:	30.74	35.82	50.59	39.60	28.05	14.63	19.40	6.71	36.23	32.429
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# Summary of Results

	Benzene EF (mg/mi)	% Change from Base	1,3 Butadiene EF (mg/mi)	% Change from Base	Arcolein EF (mg/mi)	% Change from Base
Example 1 - Base Case	50.150	-	5.657	-	0.770	-
Example 2 - Temp Increase	53.076	+5.8	5.816	+2.8	0.789	+2.5
Example 3 - 2008	28.818	-42.5	3.188	-43.6	0.422	-45.2
Example 4 - Fuel Program	32.429	-35.3	4.685	-17.2	0.421	-45.3